

The First Delay in Maternal Care: Knowledge of Obstetric Danger Signs among Pregnant Women in Pakistan

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Abstract

Maternal morbidity and mortality remain a serious challenge in low- and middle-income settings, often driven by delays in recognising and acting upon obstetric danger signs (ODS). In Sindh, Pakistan, data on pregnant women's awareness of such signs are scarce. This cross-sectional study assessed the knowledge of twelve key ODS among 415 antenatal women (≥ 12 weeks' gestation) attending Liaquat University Hospital in Jamshoro and Hyderabad. Knowledge was scored from 0 to 12 and classified as poor (0–4), average (5–8), or good (9–12). Results revealed that 46.3% of participants had poor knowledge, 39.0% had average knowledge, and only 14.7% achieved good knowledge of danger signs. Higher awareness was significantly associated with maternal education ($p < 0.001$), parity ($p = 0.003$), past obstetric complications ($p = 0.021$), and multiple ANC visits ($p < 0.001$). Alarming, 62.2% of women reported receiving no counselling during pregnancy; among those counselled, healthcare providers served as the source in 94.3% of cases. The findings highlight substantial gaps in women's recognition of critical obstetric warning signs, especially among those with limited education and early in their ANC engagement. Intensified, structured counselling during prenatal visits and broader community-based maternal health education may help mitigate the "first delay" in seeking care, ultimately reducing preventable maternal deaths.

Keywords: Maternal Care; Knowledge; Obstetric Danger Signs; Pregnant Women.

Introduction

Maternal health is a cornerstone of global public health, reflecting the physical, psychological, and social well-being of women during pregnancy, childbirth, and the postpartum period. Despite advances in medicine and health systems, maternal mortality remains unacceptably high, with profound disparities between high-income and low- and middle-income countries (LMICs). Globally, an estimated 287,000 women died from pregnancy-related causes in 2020, representing a maternal mortality ratio (MMR) of 223 per 100,000 live births (WHO et al., 2023). More recent estimates indicate that over 700 women die every day due to preventable causes, with 95% of these

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deaths occurring in LMICs (World Health Organisation [WHO], 2025). These figures highlight not only the magnitude of the challenge but also the inequities in access to timely and quality maternal healthcare.

In Pakistan, maternal mortality continues to be a pressing public health concern. The Pakistan Maternal Mortality Survey (PMMS) 2019 reported an overall MMR of 186 per 100,000 live births, with wide provincial disparities: Punjab (157), Khyber Pakhtunkhwa (165), Sindh (224), and Balochistan (298) (National Institute of Population Studies [NIPS] & ICF, 2020). These differences underscore the structural inequities in access, health system readiness, and the social determinants of maternal health across the country. Sindh, in particular, bears a disproportionate burden, ranking above the national average.

Maternal deaths are primarily caused by preventable conditions such as hemorrhage, hypertensive disorders, sepsis, and obstructed labour (Khan et al., 2006). However, beyond clinical causes, the "Three Delays" model provides a framework for understanding the systemic barriers to maternal survival. These delays include (i) delay in deciding to seek care, (ii) delay in reaching an appropriate health facility, and (iii) delay in receiving adequate and timely care (Thaddeus & Maine, 1994). Among these, the first delay — failure to recognise the severity of complications and to seek skilled care promptly — is critical. It is closely linked to women's and families' knowledge of obstetric danger signs (ODSs), which are defined as specific symptoms or indicators during pregnancy, childbirth, and the postpartum period that signal the onset of life-threatening complications requiring immediate medical attention (WHO, 2016). Commonly recognised ODSs include severe vaginal bleeding, convulsions, severe headache with blurred vision, high fever, prolonged or obstructed labour, swelling of the face or hands, foul-smelling vaginal discharge, and reduced fetal movements (Yunitasari et al., 2023; WHO, 2016).

Evidence from LMICs consistently demonstrates suboptimal knowledge of ODS. A systematic review found that women's awareness of danger signs ranged from 22% to 59% across countries, with significant gaps in recognition of convulsions, prolonged labour, and fever (Yunitasari et al., 2023). In Pakistan, hospital-based studies reflect similar concerns: only 20% of women demonstrated high awareness of ODS in Karachi, with 62% having moderate and 18% low awareness (Bibi & Khan, 2023). Another study in Rawalpindi reported that more than half of the antenatal women had poor knowledge of ODS, with education and income having a strong influence on awareness (Tahir et al., 2025). Moreover, men's limited awareness has also been shown to impede timely care-seeking, reducing women's ability to access emergency services when needed (Derbew et al., 2024).

Given Sindh's higher MMR compared with national averages, there is an urgent need to strengthen maternal health education and counselling (NIPS & ICF, 2020). Recognising danger signs early is vital to overcoming the first delay, facilitating timely referrals, and reducing preventable maternal deaths (Thaddeus & Maine, 1994; WHO, 2025). Antenatal care (ANC) clinics provide a unique and strategic entry point for such education, as they represent the most consistent interface between pregnant women and the health system (Moller et al., 2017; WHO, 2016). ANC visits are not only opportunities for routine clinical monitoring but also for imparting life-saving knowledge on danger signs and appropriate care-seeking (Kabakyenga et al., 2011; Yunitasari et al., 2023). However, gaps in counselling quality and consistency across facilities mean that many women remain inadequately informed, despite attending antenatal clinics (Ali et al., 2022; Bibi & Khan, 2023).

This study, therefore, focuses on evaluating pregnant women's knowledge of obstetric danger signs during antenatal clinic visits in Sindh, Pakistan. By assessing levels of awareness and identifying

associated socio-demographic determinants, the study aims to generate context-specific evidence that informs antenatal counselling strategies, community engagement, and provincial health policies. Findings will help address the first delay in maternal care, ultimately contributing to reducing preventable maternal mortality and aligning Pakistan with the global Ending Preventable Maternal Mortality (EPMM) strategy and Sustainable Development Goal 3.1, aiming to reduce the MMR to fewer than 70 per 100,000 live births by 2030.

Methodology

Study Design

A descriptive cross-sectional study design was employed to assess the prevalence of pregnant women's knowledge of obstetric danger signs and its association with socio-demographic and reproductive factors. This design was considered appropriate as it allows for the assessment of knowledge and associated determinants at a single point in time, enabling the identification of patterns and relationships within a defined population.

Study Setting and Duration

The study was conducted at the Outpatient Department (OPD) of Gynecology and Obstetrics at Liaquat University Hospital (LUH), Jamshoro and Hyderabad. LUH is one of the largest tertiary care hospitals in Sindh, serving patients from urban, semi-urban, and rural areas. Antenatal clinics within the gynecology and obstetrics OPD provide routine check-ups, counselling, and make them a suitable setting for evaluating maternal awareness of obstetric danger signs. Data Collection was carried out over three months, following approval from the Ethics Review Committee (ERC) of LUMHS (Approval No. LUMHS/REC/-797, dated June 02, 2025).

Study Population and Sampling

The study population consisted of pregnant women attending antenatal clinics at Liaquat University Hospital (LUH) during the study period. A purposive sampling technique was employed to recruit participants, as this approach ensured the inclusion of women meeting the study criteria. All pregnant women who provided written informed consent were eligible for participation, irrespective of parity or gravidity.

Exclusion criteria included women in active labour, those in early pregnancy (<12 weeks), and those with significant pregnancy-related complications such as diabetes, pregnancy-induced hypertension, cardiac disease, or renal disease. These conditions were excluded as they may alter health-seeking behaviour or necessitate frequent clinical encounters, potentially influencing participants' responses.

Sample Size

The sample size was calculated using a single population proportion formula: $n = Z^2 p q / e^2$, where n is the required sample size, Z is the critical value at 95% confidence level (1.96), p is the estimated prevalence of maternal knowledge of obstetric danger signs (43.3%) (Bibi & Khan, 2023) $q = 1 - p$, and e is the margin of error (5%). Substituting values gave $n = 378$. After adjusting for a 10% non-response rate, the final sample size was set at 415 participants. The prevalence estimate was based on a recent Pakistani study, which reported a maternal knowledge rate of 43.3%.

Study Variables

The independent variables included maternal age, religion, education, husband's education, occupation, monthly household income, parity, number of antenatal visits, and history of obstetric

complications. The dependent variable was awareness of obstetric danger signs, measured using 12 validated items.

Data Collection Tool and Procedure

Data were collected using a structured and validated questionnaire adapted from Bibi et al. (2023) with the author's permission. The tool was translated into Urdu and Sindhi and pretested for clarity and cultural appropriateness. It comprised three sections: sociodemographic and reproductive characteristics; knowledge of obstetric danger signs; and sources of information. Interviews were conducted face-to-face in Urdu, Sindhi, or English, according to the participant's preference, to minimise literacy-related bias. Each correct response to knowledge questions was scored "1," and incorrect responses were scored "0." The total score ranged from 0 to 12 and was categorised as poor knowledge (0–4), average knowledge (5–8), and good knowledge (9–12).

Data Analysis

The data were coded, entered, and analysed using SPSS version 29.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise participants' characteristics and knowledge scores. Associations between awareness categories and independent variables were assessed using chi-square tests, with a p -value ≤ 0.05 considered statistically significant. Results were presented in tables and graphs, including bar charts and pie charts, to facilitate clear interpretation and understanding.

Ethical Considerations

Ethical approval was obtained from the Ethics Review Committee (ERC) of Liaquat University of Medical and Health Sciences (Approval No. LUMHS/REC/-797, dated June 02 2025). Administrative permission was also obtained from the Medical Superintendent and the Head of the Department of Gynecology and Obstetrics at LUH. Written informed consent was obtained from all participants after the study was explained in their preferred language (Urdu, Sindhi, or English). Participation was voluntary, with the right to withdraw at any stage without consequences to medical care. Confidentiality was maintained by avoiding the use of personal identifiers, and completed questionnaires were stored securely. Data were used solely for research purposes, in accordance with the ERC and LUMHS guidelines.

Results

A total of 415 women participated, with the majority aged 29–39 years, married, and predominantly Muslim. Nearly half were uneducated, and one-third of their husbands had no formal education. The majority were homemakers from lower-income households. More than half were multiparous, and 12% reported previous obstetric complications. Knowledge of obstetric danger signs was limited. While vaginal bleeding, uterine contractions, and decreased fetal movement were commonly recognised, awareness of convulsions, blurred vision, and shortness of breath was low. Overall, 46.3% of women had poor knowledge, 39.0% average, and only 14.7% good knowledge.

First-time ANC attendees were disproportionately represented in the group with poor knowledge, underscoring the value of repeated visits. Most women (62.0%) reported no counselling during pregnancy; among those counselled, healthcare providers were the primary source (94.1%). Significant associations were observed between maternal education, parity, previous complications, and awareness levels.

Socio-demographic Characteristics of Participants

A total of 415 pregnant women participated in this study. The mean age was 28.9 ± 4.5 years, with most (78.6%) aged between 29 and 39 years. Nearly half of the women (45.1%) were uneducated, while only 1.2% had intermediate or higher education. Husbands' education followed a similar pattern, with almost one-third uneducated (29.9%). The majority of participants were housewives (97.1%), and most households reported a monthly income of PKR 50,000–60,000 (82.2%). More than half of the women (54.2%) were multigravida, while 12% had experienced previous obstetric complications (Table 1).

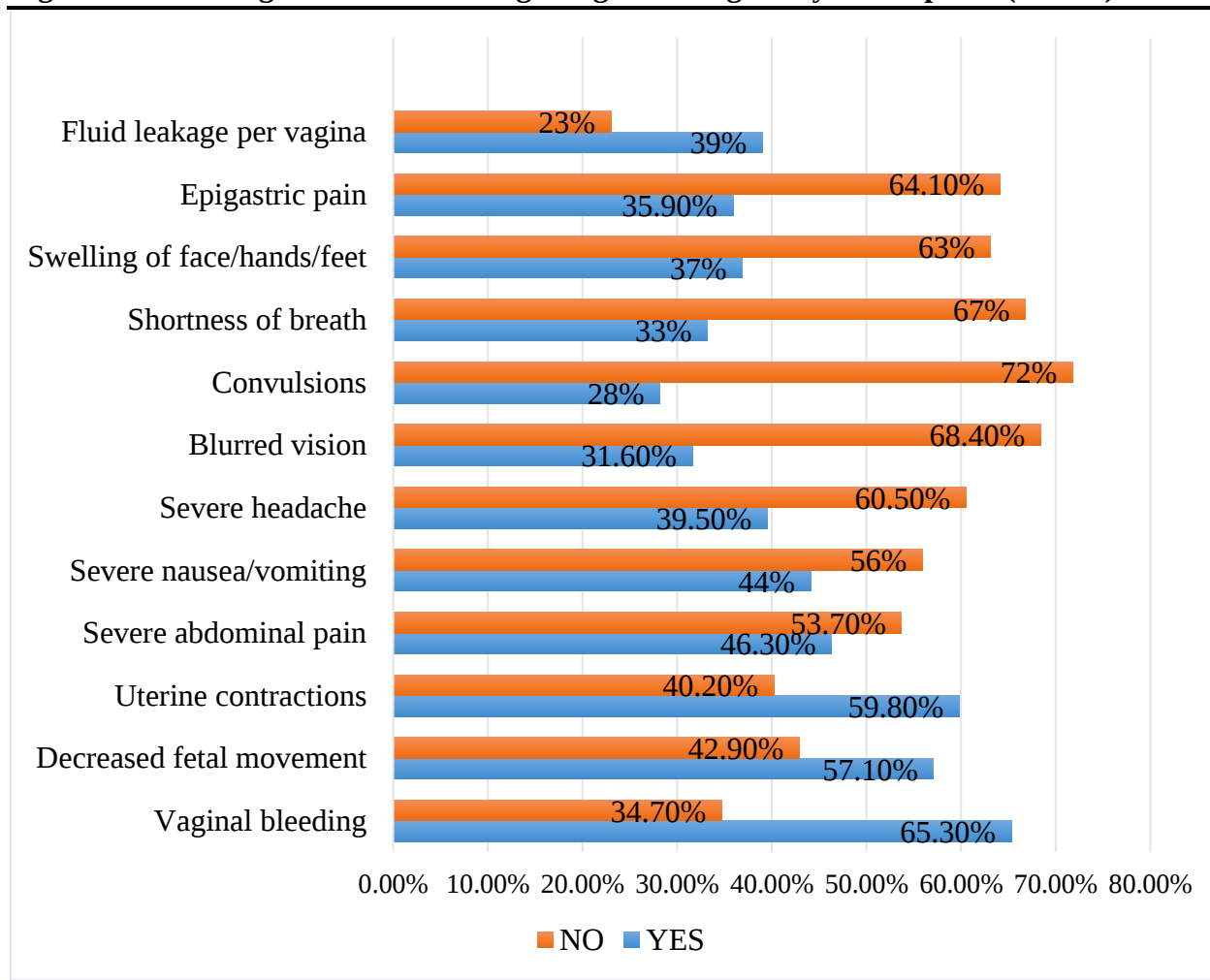
Table 1: Socio-demographic Characteristics of Participants (N = 415)

Variable	Frequency (%)
Age Distribution	
18–20 years	66 (15.9%)
29–39 years	326 (78.6%)
>39 years	23 (5.5%)
Mean $\pm$ SD	28.96 ± 4.51
Religion	
Muslim	393 (94.7%)
Hindu	15 (3.6%)
Christian	7 (1.7%)
Women's Education	
Uneducated	187 (45.1%)
Primary	169 (40.7%)
Matriculation	54 (13.0%)
Intermediate/Higher	5 (1.2%)
Husband's Education	
Uneducated	124 (29.9%)
Primary	174 (41.9%)
Matriculation	92 (22.2%)
Intermediate/Higher	25 (6.0%)
Employment Status	
Housewife	403 (97.1%)
Employed	5 (1.2%)
Self-employed	7 (1.7%)
Monthly Income	
30,000–40,000 PKR	9 (2.2%)
40,000–50,000 PKR	38 (9.2%)
50,000–60,000 PKR	341 (82.2%)
>60,000 PKR	27 (6.5%)
Gravida	
Gravida 1	35 (8.4%)
Gravida 2	155 (37.3%)
Gravida ≥ 3	225 (54.2%)
Previous Complications	
Yes	50 (12.0%)
No	365 (88.0%)

Knowledge of Obstetric Danger Signs Among Participants

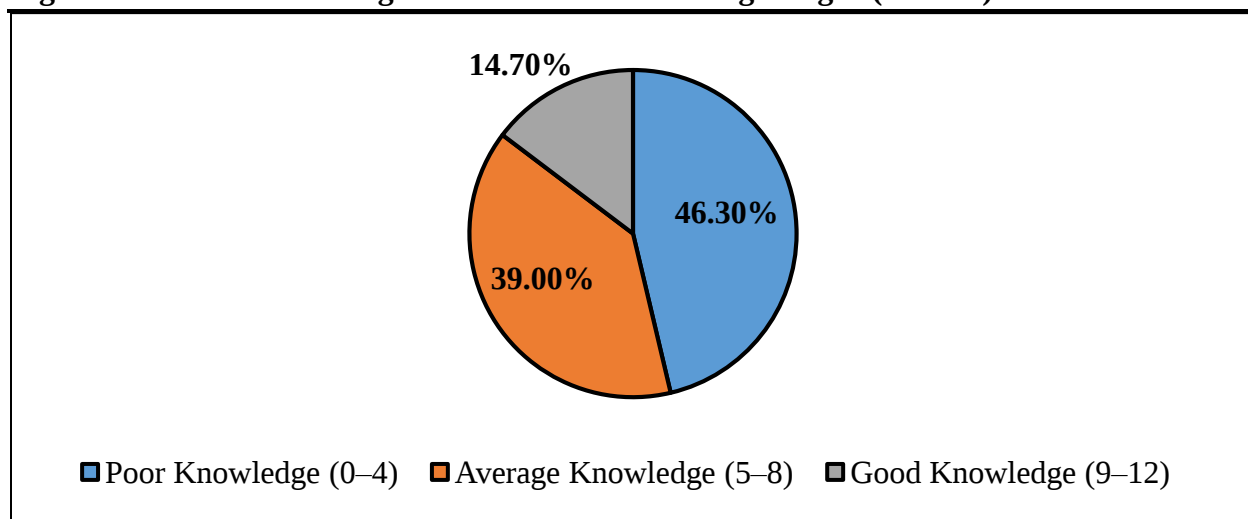
Knowledge levels varied considerably. The most commonly recognized danger signs were vaginal bleeding (65.3%), uterine contractions (59.8%), and decreased fetal movement (57.1%). In contrast, recognition of convulsions (28.2%), blurred vision (31.6%), and shortness of breath (33.2%) was low (Figure 1).

Figure 1: Knowledge of Obstetric Danger Signs Among Study Participants (n =415)



Overall Knowledge Levels of Obstetric Danger Signs

As shown in Figure 2 nearly half of the women (46.3%) had poor knowledge of obstetric danger signs, 39.0% had average knowledge, and only 14.7% demonstrated good knowledge. Women with no prior ANC visits were more likely to have poor knowledge, whereas repeated attendance was associated with better awareness.

Figure 2: Overall Knowledge Levels of Obstetric Danger Signs (n = 415)

Association Between Socio-Demographic Characteristics and Knowledge of Obstetric Danger Signs

Table 2 shows significant associations between knowledge and women's education ($p < 0.001$), parity ($p = 0.003$), previous complications ($p = 0.021$), and ANC visits ($p < 0.001$). Higher education, multiparity, prior complications were linked to better knowledge. Husbands' education, income, and occupation showed trends, though not all reached significance.

Table 2: Association Between Socio-Demographic Characteristics and Knowledge of Obstetric Danger Signs (n = 415)

Variable	Poor Knowledge n (%)	Average Knowledge n (%)	Good Knowledge n (%)	Chi-square (χ^2)	p-value
Women's Education					
Uneducated	120 (64.2%)	58 (31.0%)	9 (4.8%)	46.28	<0.001*
Primary	58 (34.3%)	84 (49.7%)	27 (16.0%)		
Matriculation+	14 (20.0%)	21 (30.0%)	35 (50.0%)		
Husband's Education					
Uneducated	70 (56.5%)	42 (33.9%)	12 (9.6%)	8.62	0.071
Primary	66 (37.9%)	78 (44.8%)	30 (17.3%)		
Matriculation+	34 (28.1%)	42 (34.7%)	45 (37.2%)		
Occupation					
Housewife	190 (47.1%)	160 (39.7%)	53 (13.2%)	4.39	0.112
Employed/Self-employed	2 (14.3%)	2 (14.3%)	10 (71.4%)		
Monthly Income					
≤50,000 PKR	80 (54.1%)	55 (37.2%)	13 (8.7%)	9.82	0.042*
>50,000 PKR	112 (42.0%)	107 (40.2%)	48 (17.8%)		

Parity (Gravida)

Primigravida	26 (74.3%)	8 (22.9%)	1 (2.8%)	16.53	0.003*
2nd Gravida	63 (40.6%)	71 (45.8%)	21 (13.6%)		
Multigravida (≥ 3)	103 (45.8%)	83 (36.9%)	39 (17.3%)		

Previous**Complications**

Yes	11 (22.0%)	20 (40.0%)	19 (38.0%)	7.69	0.021*
No	181 (49.6%)	142 (38.9%)	42 (11.5%)		

*Significant at $p \leq 0.05$

Antenatal Care Attendance and Knowledge Levels

As shown in Table 3, ANC attendance was strongly associated with knowledge of obstetric danger signs ($\chi^2 = 18.45$, $p < 0.001$). Women attending their first ANC visit had predominantly poor knowledge (62.4%) with few demonstrating good knowledge (6.4%), whereas those with ≥ 2 visits showed higher proportions of average (42.0%) and good knowledge (18.0%).

Table 3: Antenatal Care Visits During Pregnancy vs. Knowledge Levels (n = 415)

ANC Visits	Poor n (%)	Average n (%)	Good n (%)	Total n (%)
First ANC visit (whole pregnancy)	78 (62.4%)	39 (31.2%)	8 (6.4%)	125 (100%)
≥ 2 ANC visits	114 (39.0%)	123 (42.0%)	53 (18.0%)	290 (100%)
Total	192(46.3%)	162 (39.0%)	61 (14.7%)	415 (100%)

$\chi^2 = 18.45$, $p < 0.001$

Counseling Exposure and Knowledge Levels

Table 4 shows a significant association between counseling exposure and knowledge of obstetric danger signs ($\chi^2 = 29.73$, $p < 0.001$). Among women who received counseling, 24.8% had good knowledge and 47.8% had average knowledge. In contrast, those without counseling were mostly in the poor knowledge group (57.8%), with only 8.5% achieving good knowledge.

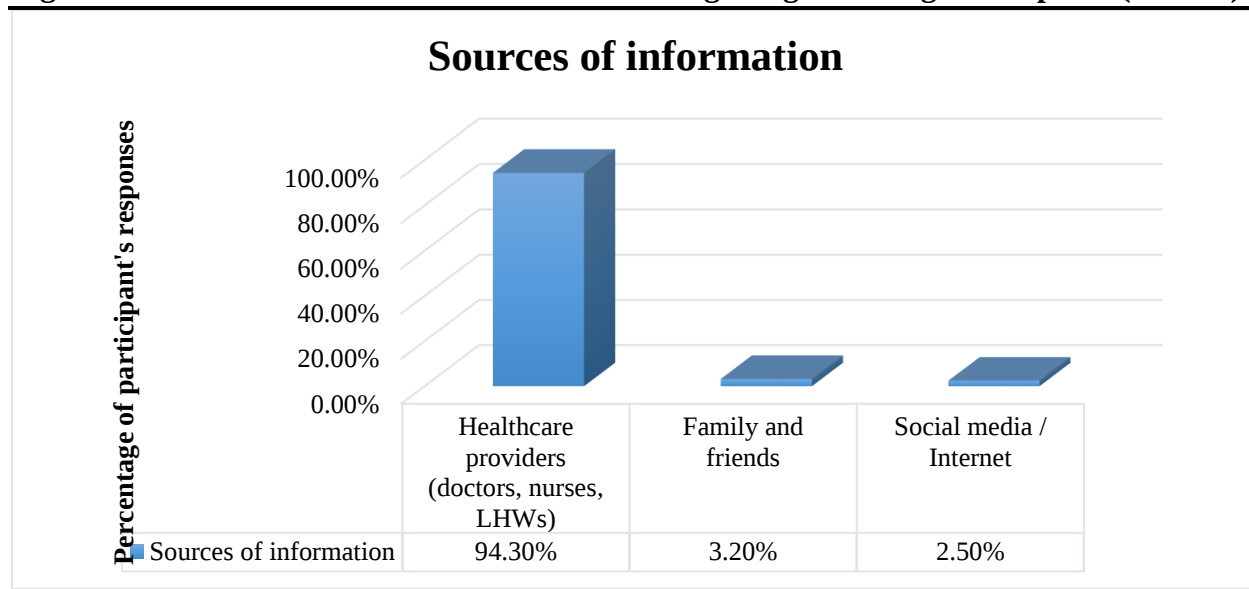
Table 4: Counseling Exposure and Knowledge of Obstetric Danger Signs (n = 415)

Counseling Exposure	Poor n (%)	Average n (%)	Good n (%)	Total n (%)
Yes (received counseling)	43 (27.4%)	75 (47.8%)	39 (24.8%)	157 (100%)
No (no counseling)	149 (57.8%)	87 (33.7%)	22 (8.5%)	258 (100%)
Total	192 (46.3%)	162 (39.0%)	61 (14.7%)	415 (100%)

$\chi^2 = 29.73$, $p < 0.001$

Sources of Information on Obstetric Danger Signs

Figure 3 shows that only 157 women (37.8%) reported receiving any information on obstetric danger signs, while 62.2% had not been counseled. Among those informed, most cited healthcare providers (94.3%) as their source, whereas family/friends (3.2%) and social media/internet (2.5%) contributed minimally.

Figure 3: Sources of Information on Obstetric Danger Signs Among Participants (n = 157)

Discussion

This study highlights that the majority of pregnant women attending antenatal clinics demonstrated poor-to-average knowledge of obstetric danger signs (ODSs), with only a small proportion achieving good knowledge. These findings are consistent with recent literature showing low maternal awareness of ODSs across Pakistan and other low- and middle-income countries (LMICs). In Ethiopia, only 44.8% of women demonstrated adequate knowledge, with strong associations between awareness and education (Mesele et al., 2023). In Zambia, Nyirenda et al. (2025) reported that over 65% of participants lacked sufficient knowledge, particularly regarding convulsions and prolonged labour. Within Pakistan, Bibi et al. (2023) and Soomro et al. (2024) also emphasised that limited awareness among pregnant women and new mothers significantly contributes to preventable delays in care-seeking.

A key finding was that recognition of ODSs varied considerably by type of symptom. Vaginal bleeding and prolonged labour were the most frequently identified, while blurred vision, convulsions, and shortness of breath were poorly recognised. This pattern is consistent with international literature, where bleeding is often the most recognised sign, while neurological and systemic signs remain poorly understood (Yunitasari et al., 2023; Elhage et al., 2024). The findings align with the conclusions of Soomro et al. (2024), who reported that Pakistani women were more likely to recognise visible neonatal danger signs than subtle ones, reflecting gaps in structured health education.

The results further showed that education was a strong determinant of knowledge. Women with lower levels of education demonstrated significantly poorer awareness compared with those with higher levels of education. A systematic review confirmed that maternal education remains one of the most consistent predictors of ODS awareness in LMICs (Uwiringiyimana et al., 2022). In Pakistan, Afridi et al. (2025) highlighted that inequalities in maternal healthcare utilisation were strongly shaped by education, wealth, and region. Similarly, a recent cross-sectional study found that first-time mothers with low educational attainment were significantly less likely to recognise neonatal danger signs, which parallels the low recognition of obstetric signs observed in our study.

(determinants of knowledge..., 2025). Together, these findings underscore that education empowers women to both recognise complications and make timely decisions in emergencies. Another significant observation was the association between antenatal care (ANC) attendance and knowledge of the subject. Women with multiple ANC visits and those who received counselling were more likely to demonstrate average or good awareness. At the same time, those attending ANC for the first time during pregnancy predominantly fell into the poor knowledge category. Similar findings were reported in Ethiopia, where ANC repeated visits significantly improved recognition of ODSs. In Pakistan, Soomro et al. (2024) emphasised the role of structured counselling at discharge in improving mothers' knowledge of neonatal danger signs, suggesting that systematic health education during ANC visits could have similar benefits for obstetric danger signs.

Parity and previous obstetric complications were also important determinants. Multiparous women and those with a history of complications were significantly more knowledgeable than primigravida women. This is consistent with studies from Kenya and Ethiopia, where multiparous women demonstrated better recognition due to cumulative pregnancy experiences (Kiptulon et al., 2025). However, despite this association, overall awareness remained insufficient, suggesting that experiential learning cannot entirely replace structured counselling.

The study further found that homemakers and women from lower-income households had the poorest knowledge levels. Similar associations were reported in Nepal and Indonesia, where socioeconomic status influenced both knowledge and care-seeking (Wulandari & Laksono, 2020; Paudel et al., 2018). Within Pakistan, socioeconomic disparities continue to limit health service utilisation and knowledge retention, reinforcing findings from Afridi et al. (2025). This suggests the need for outreach strategies that target disadvantaged groups through community health workers and tailored educational interventions.

Healthcare providers were reported as the primary source of maternal health information, yet overall knowledge remained poor. This reflects gaps in the quality and consistency of counselling. While providers remain essential, there is growing evidence that alternative channels such as community education and digital health tools can complement formal care. Campaigns such as the CDC's "Hear Her" initiative have demonstrated the effectiveness of broad-based awareness strategies (CDC, 2024). Strengthening such approaches in Pakistan could extend the reach of critical maternal health information.

In conclusion, this study confirms that maternal knowledge of ODSs in Sindh remains insufficient. Education, repeated ANC visits, counselling, and previous pregnancy experiences emerged as the most consistent determinants. The findings are consistent with national and international literature, including evidence from Soomro et al. (2024) and the determinants of knowledge study (2025), both of which emphasise that poor maternal and neonatal danger sign awareness contributes to preventable delays in care. Structured counselling at ANC clinics, community outreach, and integration of digital platforms are urgently needed to address these knowledge gaps and reduce first-delay factors in maternal care.

Conclusion

This study demonstrated that while many pregnant women had average knowledge of obstetric danger signs (ODSs), a smaller proportion showed good awareness, particularly of visible signs such as vaginal bleeding. Women who had more than two antenatal care (ANC) visits were more likely to demonstrate higher knowledge, highlighting the importance of repeated and structured counselling during pregnancy. Maternal education, parity, and previous complications also

contributed to better recognition of ODSs. In contrast, first-time ANC attendees and women with lower educational levels were more likely to have poor knowledge. These findings confirm that strengthening health education and counselling during ANC visits, particularly for vulnerable groups, is essential to reduce first-delay factors and improve maternal outcomes in Sindh and similar settings.

Implications

The study highlights the need for structured counselling during ANC visits, especially on less recognised danger signs. Policies should integrate maternal health education across facilities, supported by community health workers and digital platforms. Women should be encouraged and supported to complete the eight WHO-recommended ANC contacts to strengthen knowledge and preparedness. Multi-centre longitudinal studies are needed to assess how improved awareness affects timely care-seeking and outcomes.

Recommendations

Counselling on obstetric danger signs should be included in every ANC visit, with a focus on first-time attendees, women with low education, and those from low-income households. Training providers in standardised counselling and engaging families and community workers can help reinforce awareness. Digital tools—such as mobile reminders and WhatsApp messages—may further sustain knowledge and promote timely care-seeking.

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